BACKGROUND OF THE INVENTION

1.Field of the invention.

Herewith it is stated the invention of the device, which demonstrates the violation of the momentum conservation law of the center of masses of the Mechanical system. This violation is happening due to the existing connection inside the device between the translational and rotational inertia. In four dimensional space of the theory of special relativity the translational acceleration is viewed as rotation in space-time planes, that is why the invented device was named as "four-dimensional gyroscope".

2.Description of the Prior Art.

The classical mechanics knows two types of the inertia of the object: **translational inertia** of Galileo-Newton's, the analytical expression of which is the first law of Newton's mechanics $m\bar{a} = 0$ (where m - mass and $\bar{a}$ - acceleration of the object) and the **rotational inertia** of Newton -Euler's the analytical expression of which is the first law ofNewton -Euler's mechanics $J\bar{\omega} = 0$ (where J- moment of inertia and $\bar{\omega}$ - angular velocity of the rotation of the object). In the classical mechanics it was accepted that these two types of inertia are exist additively and have no connection between them. The present invention provides four-dimensional gyroscope, which establishes such connection both in the theory and in the experiments.

The phenomenon of the inertial-mechanics is one of the most complex and not sufficiently researched problems. Experimentally in the accelerated frames we observe four

types of inertia forces:

- The centrifugal force $\bar{F}_1 = -m[\bar{\omega}[\bar{\omega}\bar{r}]]$,
- The Coriolis force, $\bar{F}_2 = -2m[\bar{\omega}\bar{v}]$,
- Inertia force, concerned with rotational acceleration $\bar{F}_3 = -m[\dot{\bar{\omega}}\bar{r}]$;
- As well as translational inertia force $\bar{F}_4 = -m\bar{W}$.

The first 3 forces are caused by the rotation of the object at 3 space angles, because they depend upon the vector of the angular velocity of the rotation $\bar{\omega}$. If we rely on the concept of the special theory of relativity, then the fourth inertia force is created by the rotation as well - the rotation in the three pseudo-euclidean angles. For example, if the object moves with the acceleration along the axis x, then its acceleration is defined through the pseudo-euclidean angle ϑ in the ct - x plane according to the formula $W = \dot{v} = cd(\tan \vartheta)/dt$.

Such concept of the inertia forces allows creating a four-dimensional gyroscope, which rotates not only at the space angles but also at the space-time ones. The principle scheme of the simplest four-dimensional gyroscope is shown below on the FIG. 7

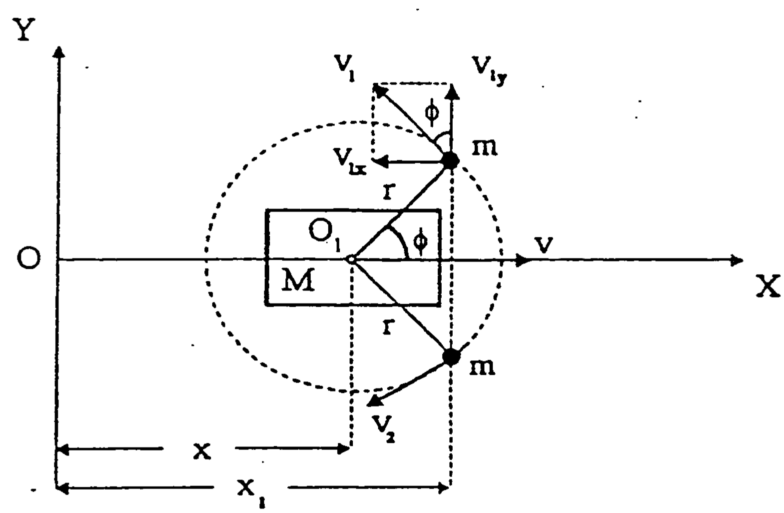

FIG. 7

The base of the device is the mass M in the center of which there is an axis O_1. At the distance r two small masses m are synchronously rotating in the different directions around the axis. In the present model these masses are rotating at the different heights in order to avoid a collision between them. If we start to rotate masses m, the central mass M will begin to oscillate with the fixed amplitude around the common center of masses. As a result we have got the simplest type of four dimensional gyroscope with the rotation at one-dimensional angle ϕ (rotation of masses m) and the rotation at one space-time angle 8 (translational acceleration of masses M along axis x).

The theoretical description of the proposed four-dimensional gyroscope is based on its translational

$$(M + 2m)\, v_c = (M + 2m)v - 2mr\omega \sin \phi \; - 2mr\omega^2 \cos \phi \; = 0$$

and rotational

$$J\omega - Jk^2 \frac{\sin\phi \cdot \cos\phi}{1 - k^2 \cdot \sin^2 \phi} \cdot \omega^2 = 0, \qquad J = 2mr^2$$

equations of motion, where v_c - velocity of the center of the mass of the gyroscope, v - velocity of mass $M, \omega = \phi$ - angular velocity of the rotation of masses m .

The solution of the translational equation proves that the center of the masses of the system is at rest or in uniform motion due to laboratory reference frame.

The four-dimensional gyroscope has got five energies:

1. Translational energy $E = (M + 2m)v^2 /2$;

2. Rotational energy $W = J\omega^2 /2$;

3. The energy of the interaction between translational and rotational inertia $H = -2mrv\omega \cdot \sin\phi$;

4. Total energy $T = E + W + H = const$ and

5. Energy of the center of the masses $E_c = (M + 2m)v_c^2 /2 = const$, which does not coincide with the total energy

Besides it has got four momentum acting along its axis x:

1. Translational momentum $P = (M + 2m)v$;

2. Rotational momentum $L = -2mr\omega \cdot \sin\phi$;

3. Total momentum $C = P + L = const$ and

4. Momentum of the center of the masses $P_c = (M + 2m)v_c = const$, corresponding with the complete momentum of the system $C = P_c$.

During the elastic collision of the four-dimensional gyroscope with the wall the following Conservation Laws are taking place:

A. Total energy

$T = E + W + H = E' + W' + H' = T' = const$

B. Linear momentum

$$P = (M+2m)v = (M+2m)v' = P' = const.$$

Besides, during the time of the collision there is one condition takes place:

$$\phi = \phi' .$$

Here the hachures indicate the denotations of the values after the collision. Joint solution of three equation system shows that the velocity of the center of the masses of the four-dimensional gyroscope changes after the collision in accordance with formula

$$v_c' = -v_c\,(1 - 2(k \cdot \sin\phi)^2\,] - 2B\omega \cdot \sin\phi\,[1 - (k \cdot \sin\phi)^2]\,, \qquad (1)$$

where $B = 2mr\,/\,(M+2m)$, $k^2 = B\,/\,r$. Simultaneously after the stroke the angular velocity of rotation is changing according to the formula

$$\omega' = \omega[1 - 2(k \cdot \sin\phi)^2] - 2 \cdot \sin\phi\,\frac{v_c}{r}\,; \qquad (2)$$

The formulas (1) and (2) show that during the absolute elastic stroke the four-dimensional gyroscope is able to transform the inner rotational energy into the translational energy of the center of the masses and vice versa. That is why after the collision the four-dimensional gyroscope can continue its motion backwards towards the wall and perform the second, third, etc. collisions with the wall. The multiple bounces will be occurring until the time when the velocity of the center of the masses changes its direction into opposite one a1 1d the mass M

departs from the wall to a distance bigger than B.

SUMMARY OF THE INVENTION

We claim the invention of the simplest type of four-dimensional gyroscope with the rotation at one space angle ϕ (rotation of masses m) as well as at one space-time angle $\vartheta = arctan\ (v/c)$, where v - is the speed of the translational motion of mass M with the fixed axis; and c- is the speed of light. During the absolute elastic collision with the wall, in our case measured by 0.001 sec, the device is demonstrating the violation of one of the basic laws of mechanics - momentum conservation law of center of masses. In order to prove experimentally that the evidence of this statement, besides four-dimensional gyroscope there was organized the scientific research center, which allowed the following:

- To visually observe the double, triple, etc. absolutely elastic collisions of four-dimensional gyroscope with the wall;
- Before and after the collision to register automatically such kinematic characteristics of four dimensional gyroscope as:
  1. Coordinate $x(t)$ mass M;
  2. Coordinate $X_c(t)$ of the center of masses;
  3. The rotation angle ϕ.
- With the help of computer programs to -calculate before and after the collision the following:
  1. Velocity $v(t)$ of mass M;

2. Velocity $v_c(t)$ of the center of masses;

3. Angular velocity $m(t)$;

4. Acceleration $A(t)$ of mass M ;

5. Acceleration $A_c(t)$ of the center of masses;

6. Angular acceleration $K(t)$.

- To prove the correctness of the formulas according to the obtained data.

BRIEF DESCRIPTION OF THE DRAWINGS DESCRIPTIONS OF THE PREFERED EMBODIMENTS

The FIG. l represents the general view of the four-dimensional gyroscope along the axis of symmetry, the colliding part, the measuring blocks and the supporting wheels.

The FIG.2 depicts the top view with the small masses *m* allocated symmetrically along the axis of symmetry *x*..

The FIG.3 depicts the view from the beneath with the adjustments for the wheels and registration equipment.

The FIG.4 adduces the drawing of the whole complex, registrating the kinematic characteristics of the four-dimensional gyroscope.

The FIG.5 the block-scheme for the research center of the absolute elastic collision of the four-dimensional gyroscope.

The FIG 6. the same view, but from the top.

The FIG.7 depicts the principle scheme of the four-dimensional gyroscope.

THE DESCRIPTION OF THE PREFERED EMBODIMENTS.

The FIG. 1 represents the general view of the four-dimensional gyroscope. The lower part 1 and the upper part 2 of the gyroscope body are made from aluminum and connected together with help of the steel studs 14. The central shaft 3 has got the differential mechanism 5, which synchronously rotates small masses 4 in the different directions. The technological handle 12 starts the rotation. As soon as small masses begin rotation, the device 24 moves forward with a certain speed towards metal wall 26 (FIG.5 al1d 6). The motion of gyroscope 24 (FIG.5, 6) is investigated on the horizontal surface 23 (FIG.5), verified with precision. At the moment of the collision with the wall the spring stud 7, secured by the hard stud 6, pounces. During the motion of four-dimensional gyroscope before and after the collision the measurements of the angles ϕ of the rotation are registered with the help of the polar ruler 8 and photo-elements 9. The notations of coordinate $x(t)$ are registered synchronously with the help of the photo-elements 10. The data from the photo-elements transferred to the reformatting block 13 (FIG. 2), schematically drafted on FIG 4. The signals from the photoelements 16 and 17 are sent to the amplifiers 18 and 19 (FIG. 4) then to the Analog Digital COl1verters 20 and 21. After ADC the signal, transformed into O and I, is sent to the transmitter 22, which the latter sends to the computer 25 (FIG. 5.6) for further calculations. The software program allows monitoring the kinematic parameters of the four-dimensional gyroscope before and after the collision in real time.